

[54] CHEMICALLY AND ENZYMATICALLY MODIFIED COLLAGEN HEMOSTATIC AGENT

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#### Related U.S. Application Data

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[58] Field of Search ..... 195/6; 260/123.7; 435/273; 128/DIG. 8; 106/161, 155

#### References Cited

##### U.S. PATENT DOCUMENTS

2,973,302	2/1961	Bloch .....	195/6
3,034,852	5/1962	Nishihara .....	260/123.7 X
3,071,477	1/1963	Klevens .....	195/6 X
3,114,593	12/1963	Griset et al. ....	264/103 X
3,157,524	11/1964	Artandi .....	260/123.7 X
3,314,861	4/1967	Fujii .....	195/6
3,393,080	7/1968	Erdi et al. ....	260/123.7 X
3,632,361	1/1972	Battista .....	260/123.7 X

3,637,642	1/1972	Fujii .....	260/123.7 X
3,649,347	3/1972	Battista .....	260/123.7 X
3,898,129	8/1975	Fujimoto et al. ....	195/6 X
4,066,083	1/1978	Ries .....	195/6 X
4,140,537	2/1979	Luck et al. ....	260/123.7

#### OTHER PUBLICATIONS

Journal of Amer. Chem. Soc., vol. 74, 1952, pp. 4608-4611, Gustavson.

Chem. Abstracts, vol. 47, 1953, 901h-902a-c, Lennox et al.

Chem. Abstracts, vol. 47, 1953, 11787g-i, 11788d-i, 11789a, Cassel et al., Wiederman et al., Danby et al.

Chem. Abstracts, vol. 82, 1975, 113208k, Kipnis et al. Trans. Amer. Soc. Artif. Int. Organs, Apr., 1976, Miyata et al., vol. XXII.

Chemical Reactions of Polymers, Fettes, 1965, pp. 384-386, 389-392.

Ann. Rev. of Biophysics & Bioengineering, vol. 3, 1974, pp. 231-253, Stenzel et al.

J. Clin. Inv., vol. 54, pp. 1480-1487, Dec., 1974, Brass et al.

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#### [57] ABSTRACT

Polymers of quaternary-structured collagen of minimum length, diameter and periodicity, and containing a relatively high positive electrostatic charge are claimed as hemostatic agents. Specific examples are guanidinated polymers of the type described, esterified polymers, and esterified-guanidinated polymers.

9 Claims, No Drawings